FEDERAL STATE BUDGET EDUCATIONAL INSTITUTION OF HIGHER EDUCATION
"ROSTOV STATE MEDICAL UNIVERSITY" OF THE MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION

FACULTY_ TREATMENT-PREVENTIVE,
MILITARY TRAINING CENTER

Evaluation materials

in the discipline HISTOLOGY, EMBRYOLOGY, CYTOLOGY

Speciality 05/31/01 General Medicine

2023

1. Scroll competencies, formed discipline (fully or partially)*

general professional (OPK):

Code and name general professional competence	Achievement indicator(s) general professional competence
OPK-5. Able to evaluate morphofunctional, physiological states and pathological processes in the human body to solve professional problems.	ID 1 OPK-5. Knows the algorithm of clinical, laboratory and functional diagnostics when solving professional problems.

2. Kinds estimated materials V compliance With formed competencies

Name competencies	Types of assessment materials	number of tasks **for 1 competency**
OPK-5.	Closed tasks	25 with sample answers
	Open type tasks: Situational tasks Interview questions Add-on tasks	75 with sample answers

OPK-5:
Closed-type tasks: TOTAL 25 tasks. Choose one correct answer.

Task 1. Basophilia of the cytoplasm is characteristic of cells:
a) actively secreting mucus b) accumulating lipids
c) having eyelashes
d) having microvilli
e) actively synthesizing proteins
Response standard: a) actively synthesizing proteins

*Task 2.*Protein involvedin the formation of bordered endocytic vesicles:
a) calmodulin b) clathrin
c) tubulin d) dynein e) myosin
*Sample answer:***b) clathrin**

Task 3. From the myotomes of the mesoderm somites the following develops: a) smooth muscle tissue
b) cardiac muscle tissue c) myoepithelial cells d) skeletal muscle tissue
e) muscles of the iris
*Sample answer:***d) skeletal muscle tissue**

Task 4. A large cell of loose fibrous connective tissue, process-shaped, with a large light nucleus and large (1-2) nucleoli, with basophilic cytoplasm, inwhich are revealed well-developed grEPS and Golgi complex are:
a) fibrocyte b)
macrophage c)
fibroblast
d) myofibroblast e)
fibroclast
Response standard: a) fibroblast

Task 5. Transitional epithelium lines the mucous membrane of: a) the bladder
b) stomach c)
esophagus
d) kidney tubules e)
bronchi
Response standard: a) bladder

Task 6.**Morphological classification of cartilage tissue is based on:**
a) localization in the body
b) embryonic sources
c) structural features of cells
d) structural features of the perichondrium
e) structural features of the intercellular substance
Response standard: e) structural features of the intercellular substance

Task 7. Osteoblasts:
a) localized in bone lacunae
b) synthesize components of the intercellular substance c)
synthesize elastin
d) are localized in isogenic groups e)
destroy bone
Response standard: b) synthesize components of the intercellular substance

Task 8. Parathyrin:
a) increases the calcium content in the bones
b) reduces the level of calcium in the blood
c) participates in the exchange of
immunoglobulins d) increases the level of
calcium in the blood
e) increases the level of calcium in the blood
*Response standard***: d) increases calcium levels in the blood**

Task 9.**Name the cells that synthesize histamine:**
a) fibroblasts b)
mast cells c)
fibroclasts
d) monocytes
e macrophages
Response standard: b) mast cells

Task 10. Name the cells that synthesize heparin:
a) mast cells b)
macrophages
c) fibroclasts d)
monocytes
e) fibroblasts
Response standard: a) mast cells

Task 11.**Where does the cleavage of terminal polypeptides from collagen precursorunder the influence of procollagen peptidase**: a) in the fibroblast cytoplasm
b) on GREPS of fibroblast c)
in CG fibroblast
d) on the surface of the fibroblast e)
in the intercellular substance
Response standard: d) on the surface of the fibroblast

Task 12. Plasmocyte:
a) effector cell of cellular immunity b) part of the
fibroblast differential
c) effector cell of humoral immunity d) enters the
differential of keratinocytes
e) monocyte derivative
Response standard: c) effector cell of humoral immunity

Task 13. Cells of the fibroblastic series include:
a) monocyte
b) endothelial cell
c) mast cell
d) fibrocyte
e) plasma cell
Response standard: d) fibrocyte

Task 14. With Marfan syndrome, education is disrupted:
a) collagen fibers b) chondrin
fibers c) reticular fibers d)
ossein fibers
e) elastic fibers
Response standard: e) elastic fibers

Task 15. Reticular fibers contain:
a) type III collagen b)
type V collagen c)
type II collagen d)
type IV collagen e)
type I collagen
Response standard: a) type III collagen

Task 16. Glyxaminoglycans are synthesized:
a) fibrocytes
b) fibroblasts

c) plasma cells d)
adipocytes e)
macrophages
Response standard: b) fibroblasts

Task 17.**In the metabolic zone of the endothelium, the main ultrastructures are:**
a) mitochondria b)
GREPS
c) Golgi apparatus pinocytotic vesicles d) filament
network
e) pinocytotic vesicles
Response standard: e) pinocytotic vesicles

Task 18.**What structures are missing in the arteriole wall?:**
a) pericytes
b) elastic membrane c)
smooth myocytes
d) RVST
e) endothelium
Response standard: a) pericytes

Task 19. The wall of the somatic capillary does not contain:
a)
endothelium
b) pericytes
c) adventitial cells d)
fenestrae
d) BM
Response standard: d) fenestrae

Task 20.**At the 2-3rd week of embryogenesis, the first blood vessels appear in:**
a) mesenchyme of the amniotic vesicle b)
endoderm
c) mesenchyme of the chorion
d) allantois mesenchyme
e) mesenchyme of the yolk sac
Response standard: e) mesenchyme of the yolk sac

Task 21. What is the cavity of the heart sac lined with?:
a) stratified squamous epithelium b)
endothelium
c) transitional epithelium d)
mesothelium
e) single-layer prismatic epithelium
Response standard: d) mesothelium

Task 22. What are heart valves formed by?:
a) protrusion of the myocardium
b) loose fibrous connective tissue c) hyaline cartilage
d) smooth muscle tissue of the endocardium

e) dense fibrous connective tissue and endothelium
Response standard: e) dense fibrous connective tissue and endothelium

Task 23.**Cells forming the atrioventricular bundle of His- This:**
a) Purkinje cells
b) contractile cardiomyocytes c) secretory
cardiomyocytes
d) transitional cells e) P-
cells
Response standard: a) Purkinje cells

Task 24. Under the endocardium there are:
a) working cardiomyocytes b)
secretory cells
c) contractile cells
d) transitional cardiomyocytes e)
Purkinje cells
Response standard: e) Purkinje cells

Task 25.**Secretory cardiomyocytes of the right atrium synthesize:**
a) glycosaminoglycans b)
norepinephrine
c) adrenaline d)
atriopeptin
e) vasointestinal polypeptide
*Response standard***: d) atriopeptin**

Open type tasks: TOTAL 75 tasks*

Task 1. Teenager 14 years old; went to the school infirmary after a physical education lesson about an abrasion of his left shin. The wound was treated with an aseptic solution. A sterile dressing is applied. What cells will account for the regeneration of the skin epithelium and their localization?
Sample answer: poorly differentiated cells that are located in the basal layer of the epidermis.

Task 2. When wearing incorrectly selected shoes, marks form on the soles of the feet.
"corns" are fragments of the epithelium (epidermis) increased in thickness. Due to what layer does the epidermis compensatory increase its thickness?
Sample answer: stratum corneum.

Task 3. An immunohistochemical study of biopsy material was performed on a patient with a suspected breast tumor. Certain types of cytokeratins have been identified. What is the origin of the tumor?
Sample answer: epithelial (from cells of the excretory ducts).

Task 4. With some pathologies in the human body, the flickering (oscillatory) activity of the cilia decreases. What organs are these?
Sample answer: airways (nasal cavity, larynx, trachea, bronchi); the fallopian tubes; uterus.

Task 5. Young man 17 years old; turned to a gastroenterologist with complaints of loss of body weight with a normal amount of food consumption. The study found a decrease in absorption function. Which cells in the epithelium of the small intestine are responsible for this process?
Sample answer: bordered enterocytes.

Task 6. In a number of skin pathologies, detachment of the epithelium (epidermis) from the underlying connective tissue occurs. Violations in what structure is this process associated with?
*Sample answer:*with elements of the basement membrane.

Task 7. Girl 16 years old; I consulted a dermatologist with a complaint about the formation of "black dots" on my face. The doctor explained that the problem was a blockage.....continue the sentence.
Sample answer: excretory ducts of the sebaceous glands.

Task 8. Man, age 30; went to the doctor with complaints of pain when swallowing saliva and food. A visual examination by an otolaryngologist revealed an enlargement of the right palatine tonsil. Explain due to what structures and cells in the amygdala can increase its volume?
Sample answer: due to an increase in the volume of lymph nodes due to intensively multiplying lymphocytes.

Task 9. Justify from a "morphological point of view" the prescription of some drugs sublingually - under the tongue.
Standard answer: the thickness of the mucous membrane is thinner, the degree of keratinization of the oral epithelium is less, the density of blood vessels in the mucous membrane is higher, therefore, the absorption of the drug is faster. The drugs do not undergo metabolism in the liver, moving through the venous section, and then entering the systemic circulation, therefore, their destruction does not occur.

Task 10. A patient had the pulp of a permanent tooth removed by a dentist. What will happen to the tooth itself? Justify your answer
Sample answer: tooth tissue: dentin and cement, as well as the periodontal ligament will not receive nutrition and be renewed, which will lead to inevitable destruction from mechanical stress when chewing food. The enamel will also be destroyed. The tooth will fall out.

Task 11. When examining a patient by a dentist, extensive destruction of the enamel of several teeth was discovered. Will it recover through physiological regeneration? Justify your answer.
Standard answer: natural restoration of enamel will not occur because... the cells that form it, ameloblasts, die by apoptosis at the time of teething.

Task 12. By what signs on the electron diffraction pattern of a section of enamel can one determine that the tooth belongs to a person in the older age group of 45-70 years.
Sample answer: the cutting edges and tubercles on the tooth surfaces are erased, the surface layers of the enamel are prism-free, the micropores are clogged, the lines of Retzius are poorly expressed, numerous scratches, grooves, and cracks are found in the enamel itself.

Task 13. With polymyelitis, a systemic disorder of a person's motor activity occurs. The destruction of which CNS neurons explains the impairment of contractile activity of skeletal muscles in this pathology?
Sample answer: death of motor neurons in the anterior horns of the gray matter of the spinal cord.

Task 14. What morphological features of the structure of the esophagus determine the rapid movement of even poorly chewed food from the oral cavity to the stomach?
Sample answer: stratified non-keratinizing epithelium - protects the wall from damage; wetness of the surface of the epithelium with the mucous secretion of its own glands - a sliding effect; skeletal and smooth muscles - ensures expansion of the lumen; the adhesion of the adventitial membrane to the connective tissue of the mediastinum keeps the organ from displacement.

Task 15. When there is increased production of hydrochloric acid in the stomach, gastroenterologists prescribe drugs that suppress its production. What cells do these drugs act on, their localization?
Sample answer: parietal (parietal cells). They are located in the cardiac region and fundus of the stomach as part of simple tubular unbranched glands.

Task 16. As a result of a car accident, a 45-year-old man suffered damage to the anterior roots of the spinal cord. The processes of which cells will be damaged and what consequences should be expected?
Sample answer: axons of motor neurons are damaged, motor activity is impaired.

Task 17. Histological examination of a biopsy of the small intestine revealed the syndrome of "bare villi" - devoid of epithelial cells. Explain the reason that led to this pathological condition.
Sample answer: poorly differentiated cells located deep in the intestinal crypts died.

Task 18. What happens if you cut the dorsal roots of the spinal cord?
Standard answer: all types of sensitivity (superficial and deep) will disappear.

Task 19.
With a lack of vitamin C in food, a disease develops - scurvy, the symptoms of which are bleeding gums, hemorrhages in the mucous membrane, tooth loss. What processes in connective tissue are associated with disruption of these manifestations of the disease?
Sample answer:Vitamin C is needed for the hydroxylation of proline and lysine, i.e. for the synthesis of collagen protein.

Task 20. A histological examination of the pancreas in a 40-year-old patient reveals pancreatic islets destroyed by macrophages and lymphocytes.
Which hormones will be insufficient in the patient's blood and why?
Standard answer: insulin, glucagon, vasointestinal peptide (VIP), ghrelin, somatostatin, pancreatic polypeptide, lipocaine, kallikrein. A, B, D, D1, PP, epsilon - cells

Task 21. Scar connective tissue forms around a foreign body (splinter, splinter). What cells and how are involved in its formation?
Sample answer: Fibroblasts form collagenous scar connective tissue.

Task 22. In an experiment, an animal was injected with a chemical substance that selectively destroys interstitial Leydig cells in the testes. What changes can be detected in the blood flowing from the testes?
Sample answer: decrease in the level of the hormone testosterone.

Task 23. In a conditional experiment, the selection is disrupted
follicle-stimulating hormone (FSH) of the adenohypophysis. What changes will occur in the testis and why?
Sample answer: spermatogenesis will cease.

Task 24. . In a conditional experiment, the secretion of luteinizing hormone (LH) from the adenohypophysis was disrupted. What testicular function will be impaired and why?
Sample answer: hormone-forming.

Task 25. In an experiment, gonocytes in the wall of the yolk sac were destroyed in an embryo. What disorders will occur in the reproductive system?
Sample answer: the gonads will not be populated with germ cells.

Task 26. The microslide presents multiple sections of the convoluted seminiferous tubule. Between the tubules there is loose connective tissue, in which large accumulations of cells rich in lipid inclusions are visible. What cells are presented on the preparation, their function?
Sample answer: interstitial Leydig cells produce the male sex hormone - testosterone.

Task 27. The pH of the environment in the prostate gland was experimentally changed (alkaline was replaced by acidic). What changes will this effect cause in sperm?
Sample answer: sperm will lose the ability to move.

Task 28. When examining a child (age 1 year), it was found that his testes did not descend into the scrotum in a timely manner. If this does not happen in the future, will spermatogenesis occur in the testes? Sample answer: no, it won't.

Task 29. With mechanical trauma of the testis, affecting the integrity of the convoluted seminiferous tubules, post-traumatic aspermatogenesis develops in the testis. What is the reason for this phenomenon?
Sample answer: Violation of the integrity of the blood-testis barrier will cause autoimmunization and death of spermatogenic cells.

Task 30. To sterilize rams, the ancient inhabitants of the East placed their scrotum for a long period in a sheepskin bag. Men who work for a long time in hot shops without special protection (steelworkers, rolling mill workers) also develop aspermatogenesis. What is the reason for this phenomenon? Sample answer: prolonged exposure to high temperatures causes aspermatogenesis, since normal spermatogenesis is possible at a temperature in the scrotum no higher than 36°C.

Task 31. In an experiment, growing follicles in the ovary of an ape were destroyed. What disorders will occur in the endometrium of the uterus and why?

Sample answer: endometrial regeneration will not occur in the postmenstrual period.

Task 32. In an experiment, the corpus luteum was destroyed in the ovary of an ape. What disorders will occur in the endometrium of the uterus and why?
Sample answer: the development of the premenstrual period will not occur.

Task 33. In the experiment, the release of follicle-stimulating hormone (FSH) from the adenohypophysis was blocked. What disorders will occur in the ovary?
Sample answer: growing follicles will not enter the stage of large growth, and there will be no increase in estrogen secretion.

Task 34. Two microscopic specimens of the uterine mucosa are presented. In the first stage, the endometrium is covered with low prismatic epithelium, the uterine glands are not deep, straight, and have little secretion. On the second, the epithelium is high prismatic, the glands are deep, branched, and secrete abundantly. What phases of the menstrual cycle do these drugs demonstrate?
Standard answer: first – proliferation phase, second – secretion phase.

Task 35. In the experiment, the secretion of luteinizing hormone (LH) by gonadotropocytes of the adenohypophysis was blocked. What changes will occur in the ovary? Sample answer: ovulation and development of the corpus luteum will be disrupted.

Task 36. When analyzing the blood of a non-pregnant woman, it was discovered that the progesterone content is the upper limit of the norm, and the estrogen content is approaching the lower limit of the norm. At what phase of the menstrual cycle was the blood test taken?
Sample answer: MIDDLE SECRETION PHASE (OR PRE-MENSTRUAL).

Task 37. When analyzing the blood of a non-pregnant woman, it was found that the progesterone content approaches the lower limit of normal, and the estrogen content reaches the upper limit of normal. At what stage of the ovarian-menstrual cycle was the blood test taken?
Sample answer: BEFORE OVULATION. END OF PROLIFERATION PHASE.

Task 38. When analyzing the blood of a non-pregnant woman, it was discovered that the content of the hormones progesterone and estrogen is approaching the lower limit of normal. At what phase of the menstrual cycle was the blood test taken?
Sample answer: END OF SECRETION PHASE OR PRE-MENSTRUAL PHASE.

Task 39. During the observation of childbirth, weak labor activity was diagnosed, due to weak contractility of the myometrium. - Is it possible to stimulate labor using hormonal influence?
Sample answer: administer oxytocin.

Task 40. Patient A. has an increase in the percentage of segmented neutrophils (above 60-65%) with a complete absence of young and band neutrophils. What are such changes in the leukocyte formula called and in what cases are they observed?

Sample answer: Shift of the leukocyte formula to the right. It is observed in chronic inflammatory diseases, decreased function of the red bone marrow. The prognosis is unfavorable.

Task 41. Explain due to what morphobiochemical features of the plasmalemma and cytoskeleton are red blood cells with a diameter of 7-8 microns. pass through capillaries with a diameter of 2-3 microns. and after that they completely restore their shape.
Sample answer: Cytoskeleton (ankyrin, spectrin, band 4.1, 4.2 protein) and cell membrane (band 3 protein, glycophorin)

Task 42. During inflammatory reactions, the functions of blood cells are activated, capable of controlling the permeability of the vascular wall, which leads to the formation of tissue edema and a slowdown in the process of blood clotting. Name these cells and explain the mechanism of their influence on vascular permeability and blood clotting.
Sample answer: Basophilic leukocytes. Histamine, heparin.

Task 43. When examining patient A with helminthic infestation of the intestines in a blood smear, it was found that among leukocytes, 12% are cells with a bilobed nucleus and large oxyphilic granules in the cytoplasm. Name these cells and what role do they play in this pathology?
Sample answer: Eosinophils. No, the norm is 3-5%. Neutralization of histamine.

Task 44. A few days after the heavy post-traumatic bleeding stopped, a blood test was done on the victim. How did the number of red blood cells and leukocytes in the blood change?
Sample answer: The number of red blood cells has decreased, while the number of reticulocytes has increased; the number of leukocytes decreased.

Task 45. Patient M. was diagnosed with a sharp activation of the metabolic process in neutrophil leukocytes, in the leukocyte formula - an increase in the number of immature forms of neutrophils. What is this process called in neutrophils and what are its consequences?
Sample answer: Respiratory (breathing) explosion. It leads to the formation of reactive oxygen species, which provide a non-phagocytic type of bactericidal activity. Activators are waste products of microorganisms, tissue breakdown, cytokines, inflammatory mediators

Task 46. With a burn disease, a large loss of water and proteins is observed in the body. What is advisable to inject into the vessels and why: a) whole blood, b) blood plasma c) plasma substitutes (isotonic saline solutions)? Explain why?
Sample answer: It is advisable to transfuse blood plasma containing 90% water, proteins, other organic substances, inorganic compounds (enzymes, vitamins, hormones), as this will prevent blood thickening and restore its volume in the vessels.

Task 47. As a result of the introduction of bacteria into the human body, the content of the enzyme hyaluronidase, which is synthesized by bacteria, increased in the tissues. What is the significance of hyaluronidase and its effect on connective tissue for the life of bacteria?
Sample answer: Hyaluronidase is a factor of aggression of microorganisms, promoting their spread in the human body; hyaluronidase depolymerizes molecules of hyaluronic acid, which is the main substrate

the main substance of connective tissue. As a result, the permeability of the main substance increases, and microorganisms quickly spread in the tissues.

Task 48. A study of human blood revealed erythrocytosis, leukocytosis, anisocytosis and reticulocytosis. The leukocyte formula revealed the same number of neutrophilic granulocytes and lymphocytes. Explain the terms "erythrocytosis"
"leukocytosis", "anisocytosis" and "reticulocytosis"?
Sample answer: Erythrocytosis - an increase in red blood cells in the peripheral blood, leukocytosis - an increase in the number of leukocytes, anisocytosis - the appearance of red blood cells of different sizes in the blood, reticulocytosis - an increase in the number of immature red blood cells - reticulocytes - in the blood. The norm for a child is 4-5 days after birth.

Task 49. Most people's red blood cells contain an antigen called the Rh factor. Some people do not have this antigen, so their blood is Rh negative. If a recipient with Rh-negative blood is transfused with Rh-positive blood from a donor, his red blood cells will undergo hemolysis. Which
Will the recipient's immunocompetent cells be activated by such a blood transfusion?
Sample answer: B lymphocytes - plasma cells - synthesize antibodies.

Task 50. In gynecology, there is a pregnancy test (Aschheim-Tsondek reaction), the essence of which is that injection of the urine of a pregnant woman into female mice causes rapid maturation of ovarian follicles and ovulation in mice. What substance can cause this effect?
Sample answer: Urine containing human chorionic gonadotropin, injected under the skin of infantile immature mice, causes the animals to grow the uterus, ripen the follicles, ovulate, and form the corpus luteum. It begins to be produced by chorion tissue after implantation already on the 6-8th day, and then by the placenta. It is excreted unchanged in the urine.

Task 51. In the experiment, the mesonephric duct was removed from the embryo. What disorders will occur with the further development of the excretory system and reproductive system in men and women?
Sample answer: The development of the ureters, renal pelvis, renal calyces, papillary tubules, collecting ducts and bladder is impaired.
This will not affect the egg laying in any way. The formation of the epididymal canal, the deferent and ejaculatory canals, and the seminal vesicles will be disrupted.

Task 52. In the early stages of human intrauterine development, a histophysiological connection is established between the embryo and the tissue structures of the maternal body. By what processes is this connection accomplished, and what organ ensures the functional connection of the vascular systems of the mother and fetus?
Sample answer: Implantation and placentation. Placenta.

Task 53. Currently, thanks to the achievements of experimental and clinical embryology, in vitro fertilization of an egg with subsequent transplantation of early embryos into the uterus is successfully carried out. What period of a woman's menstrual cycle is most favorable for early embryo transplantation? Explain why?
Sample answer: Premenstrual. The endometrium is prepared to receive the zygote.

Task 54. Embryogenesis of mammals and humans is characterized by regulatory development, which is mechanical contacts between blastomeres and chemical interactions between them. What types of interactions exist between blastomeres, and what protein is important for these contacts?
Sample answer: Tight junctions - at the points of contact of membranes, integral plasma membrane proteins (transmembrane - claudins, occludins, cadherins, cytoskeletal proteins and adhesion proteins - uvomorulin). Gap contacts - plasmalemmas are brought closer to 2-3 nm, numerous semi-channels - connexons, joining into the gaps - are found. Connexons are formed by proteins called connexins.

Task 55. Currently, it is known that the number of identical twins born to a woman does not exceed eight. What is the mechanism for the occurrence of identical twins in the earliest stages of embryogenesis and why cannot there be more than eight identical twins?
Sample answer: In the early stages of cleavage, blastomeres are totipotent. After the eight-cell stage of the embryo, compaction and positional rearrangement of the embryo occur - blastomeres are divided into superficial and internal.

Task 56. During the process of gastrulation, cells are evicted from all germ layers (in humans, mainly from the mesoderm). The cells have an irregular shape, many processes in contact with the processes of neighboring cells, and a rounded nucleus. Name what tissue these cells form, and what tissues will develop from it?
Sample answer: Mesenchymal cells are located in the primary body cavity in the spaces between the germ layers. Mesenchyme serves as a source of formation of: blood cells, smooth myocytes, PBCT cells, blood vessels

Task 57. During a gynecological examination of a woman, an ultrasound examination showed that the embryo was implanted in the mucous membrane of the fallopian tube (the most common form of ectopic pregnancy). Hormonal examination revealed a low increase in β hCG. What morphofunctional features of the fallopian tube wall make such embryo implantation possible?
Sample answer: Similarities - the general principle of the structure of the wall. The differences are the small thickness of the muscle tissue, lack of adequate differentiation of the epithelium, lack of sufficient blood supply, and poor ability to stretch the wall.

Task 58. There is a so-called perforin mechanism of cell destruction (i.e., destruction by one cell, for example, an immunocompetent cell, of another cell, for example, a tumor), when a killer cell releases substances (perforins) that form transmembrane pores in the target cell. What is the immediate cause of death of the target cell?
Sample answer: The integrity of the plasmalemma is a necessary condition for creating an ion gradient between the cell cytoplasm and the extracellular matrix. It also prevents excess water from entering the cytoplasm from the extracellular space and the onset of osmotic equilibrium. Violation of the integrity of the cytolemma as a result of the formation of perforin pores leads to the entry of fluid into the cell in accordance with the laws of osmosis, its swelling and ultimately to rupture and death.

Task 59. Describe the sequence of morphological changes (involvement of cells) when the skin of a finger is deeply cut with a sharp knife.
Sample answer: a scar forms at the site of the incision, the epidermis is completely restored.

Task 60. Cells with basophilic granularity are located along the capillary wall. What kind of cells are these and what substances are contained in their granules?
Sample answer: Mast cells, the granules of which contain hepari and histamine SRS-A chemotactic factors for eosinophils, platelets, neutrophils, chymase, tryptase.

Task 61. Cells are visible in a preparation of loose fibrous connective tissue oval in shape, medium in size, with a round nucleus, the chromatin in which is located like "spokes in a wheel". The electron diffraction pattern shows a well-developed granular cytoplasmic reticulum. What are these cells and what is their role?
Sample answer: plasma cells are effector cells of humoral immunity, produce immunoglobulin antibodies.

Task 62. A large amount of hydroxyproline is detected in the patient's urine. What happens to the patient?
Sample answer: collagen breakdown occurs fibers because proline- a marker for collagen protein, and since there are a lot of collagen fibers in the bones, bone breakdown occurs.

Task 63. In a preparation stained with iron hematoxylin, thick muscle fibers are visible, in which the nuclei are located on the periphery, and transverse striations are clearly visible. What type of muscle tissue is this?
Sample answer: striated skeletal muscle tissue.

Task 64. In a preparation stained with iron hematoxylin, thin muscle fibers are visible, in which the nuclei are located in the center, transverse striations and intercalated discs are clearly visible. What type of muscle tissue is this?
Sample answer: striated cardiac muscle tissue.

Task 65. On the electron diffraction pattern of the myofibril, disks I are not detected, telophragms (Z-lines) are close to disk A. In what phase of functional activity is the muscle fiber located?
Sample answer: In the contraction phase.

Addition

Task 1. The structural and functional unit of lamellar bone is -_____

Sample answer: osteon

Task 2. The fibroblast differentiation includes the following cells: fibroblasts, fibroclasts, poorly differentiated fibroblasts, myofibroblasts,_____

Sample answer: fibrocytes

Task 3. Bone cells are not differentiated_____

Sample answer: osteoclasts

Task 4. The Vater-Pacini body is not free_____nerve ending

Sample answer: encapsulated

Task 5. Axo-muscular synapse is_____

*Sample answer:*motor ending

Task 6. In the endocardium there are: endothelium, subendothelium, muscle-elastic layer,___

*Sample answer:*outer connective tissue layer Task 7. The target

cell of lactotropic hormone - Sample answer: lactotropocyte of

the mammary gland

Task 8. The cortex of the lymph node is presented_____

*Sample answer:*lymph nodes

Task 9. Myoepithelial cells during lactation are stimulated by the hormone_____

*Sample answer:*oxytocin

Task 10. The main cells of the simple tubular glands of the stomach produce_____

*Sample answer:*pepsinogen OPC-5

Interview Questions

Section 1. Cytology (Cell Biology).

1. Contents, place of histology, cytology and embryology in the system of doctor training. The role of domestic scientists in the creation of independent departments of histology in Russia in the 19th century. The current stage in the development of histology, cytology and embryology.

2. Methods for making preparations for light microscopy, staining methods, types of microspecimens. Microscopy techniques in light microscopes.

3. Electron microscopy. Methods for studying living cells - tissue cultures outside and inside the body, cloning, formation of cell hybrids, intravital staining.

4. The subject and tasks of cytology, its significance in the system of biological and medical sciences. Basic provisions of cell theory at the present stage of scientific development.

5. General principle of organization of a eukaryotic cell.Buildings function of the cell membrane - plasmalemma.

6. Membrane transport: passive, active, lightweight. Endocytosis, its varieties. The concept of exocytosis and transcytosis.

7. The concept of membrane receptors and the functions they perform.

8. Intercellular connections - mechanical and communication connections.

9. Cytoplasm. Hyaloplasm. The concept of cell compartmentalization.
Physico-chemical properties, chemical composition. Participation in cellular metabolism.

10. Core. Structures and significance of the interphase nucleus (karyolemma, karyoplasm, types of chromatin, nucleolus).

11. Organelles. Classifications (organelles of general and special significance). The concept of organelles of general importance.

1) The structure and significance of the agranular and granular endoplasmic reticulum. The structure and significance of ribosomes.
2) The structure and significance of the Golgi complex. The structure and significance of lysosomes, types of lysosomes.
3) The structure and significance of mitochondria.
4) The structure and significance of peroxisomes.
5) Cell cytoskeleton (microtubules, microfilaments, intermediate filaments). Structure and meaning.

12. The structure and significance of special organelles / cilia, microvilli, myofibrils, acrosomes and sperm flagellum /.

13. Cytoplasmic inclusions, their classification, significance.

14. Cell reproduction. Cell cycle. Phases of the cycle: interphase, mitosis (biological significance of mitosis and its mechanism, stages of mitosis).

15. Endomitosis, polyploidy (mechanisms of formation, functional significance).
16. Biological features and significance of meiotic division.
17. Regulation of the cell cycle: the importance of proto-oncogenes and antioncogenes, growth factors, kelons.
18. Cell death: necrosis, degeneration, apoptosis (programmed cell death), characteristics of structural and functional changes in cells.

Section 2 General embryology.

1. Embryology of mammals as a basis for understanding the characteristics of human embryonic development.
2. An idea of the biological processes underlying the development of the embryo/ epigenomic inheritance, embryonic induction, determination, division, cell migration, growth, differentiation, cell interaction, cell death/. Violation of determination processes as a cause of anomalies and deformities.
3. The concept of ontogenesis. His periods.
4. Progenesis. Spermatogenesis. Oogenesis. Features of the structure of germ cells (sperm, eggs, types of eggs).
5. The main stages of embryogenesis.
6. Fertilization, biological significance.
7. Splitting up. Types of crushing and dependence on the type of egg. The structure of the embryo at different stages of cleavage (morula). The structure of the blastula in different vertebrates.
8. Gastrulation, essence, main methods.
9. Germ layers and their derivatives. Axial complex of organ primordia.
10. Ecto- and endoderm derivatives.
11. Formation of mesoderm, its differentiation. Differentiation of somites, segmental stalks, splanchnotome layers of mesoderm.
12. Mesenchyme, sources of development, derivatives.

Section 3. General histology

1) Fabrics.

1. The concept of tissue as a system of cells and their derivatives. Patterns of the origin and evolution of tissues, A.A. Zavarzin's theory of parallelism and N.G. Khlopin's divergent evolution, their contribution to the current level of scientific development.
2. Cells as leading elements of tissue. Noncellular structures: symplasts, intercellular substance, syncytia.
3. Cell populations (cell type, differon, clone). Static, growing, renewing cell populations. Stem cells and their properties.
4. Determination and differentiation of cells, commitment of potencies. Differentons.
5. Principles of tissue classification.

2) Epithelial tissue

1. Classification of epithelial tissues (morphological, genetic, functional).
2. General characteristics of epithelial tissues.
3. Embryonic sources of development of epithelial tissues.
4. Covering epithelia. Borderline position. The structure of single-layer and multilayer epithelium. Principles of structural organization and function.
5. Basal membrane: structure, functions, origin.
6. Features of intercellular contacts in various types of epithelium.
7. Cytokeratins as markers of various types of epithelial tissues.
8. Physiological and reparative regeneration of the epithelium.
9. Localization, structure and biological features of the mesothelium.
10. Full name and structural features of the intestinal epithelium.
11. Full name and structural features of the tracheal epithelium.
12. Localization, structure, functions of stratified squamous keratinizing epithelium.
13. Localization, structure, functions of stratified squamous non-keratinizing epithelium.
14. Localization, structure and significance of the transitional epithelium.
15. Glandular epithelium, its morphofunctional characteristics.
16. Classifications of glands. Features of the structure of endocrine glands, compared to exocrine glands.
17. Secretory cycle, its phases. Types of secretion.

18. Classification of exocrine glands. The principle of the structural organization of their secretory (terminal) sections.

3). Blood and lymph.

1. The main components of blood as tissue (plasma and formed elements). Blood functions.
2. The content of formed elements in the blood of an adult. Blood formula. Age and gender characteristics of blood.
3. Red blood cells (size, shape, structure and functions, classification of red blood cells by shape, size and degree of maturity).
4. Leukocytes (classification, general characteristics, leukocyte formula).
5. Granulocytes (neutrophils, eosinophils, basophils, their content, size, shape, structure, main functions).
6. Agranulocytes (monocytes, lymphocytes, number, size, structure and function).
7. Blood platelets (platelets): Dimensions, structure, function.
8. Lymph. Lymphoplasm and formed elements. Connection with blood, concept of lymphocyte recycling.
9. Embryonic hematopoiesis and lymphopoiesis. Postembryonic hematopoiesis (physiological blood regeneration, blood stem cells (BSC) and colony-forming units (CFU).
10. Regulation of hemo- and lymphopoiesis, the role of the microenvironment.

4). Connective tissues.

1. General characteristics of connective tissues. Classification. Histogenesis.
2. Classification of connective tissues themselves. Their morpho-functional characteristics.
3. Cellular composition of connective tissues themselves. The concept of fibroblast differential, structural features, the significance of each differential cell.
4. Macrophages, their origin, types, structure, role in the body's defense reactions. The concept of the mononuclear phagocyte system.
5. Mast cells, their structure, significance.
6. Plasma cells, their origin, structure, significance.
7. Adventitial cells, their origin, structure and functional characteristics.
8. Pigment cells, their origin, structure, function.
9. Adipocytes (fat cells) of white and brown adipose tissue, their origin, structure and significance.
10. Intercellular substance of connective tissue (fibersand the main thing amorphous substance). Morphological and histochemical characteristics of the main (amorphous) substance.
11. Structure, chemical composition, significance of collagen and elastic fibers. The structure and significance of the variety of collagen fibers - reticular fibers.
12. Participation of connective tissue cells in the formation of its intercellular substance and maintenance of its condition.
13. Interaction of PBCT cells in immune and inflammatory reactions.
14. Dense fibrous connective tissue, its types, structure and functions. Tendon as an organ, structure and function.
15. The structure and significance of connective tissues with special properties (reticular tissue, adipose tissue, pigment tissue, mucous tissue).

5). Skeletal tissues.

1. General characteristics of skeletal tissues. Classification.
2. Types of cartilage tissue (hyaline, elastic, fibrous).
3. Features of the structure of various types of cartilaginous tissues, their localization. Age-related changes, mineralization of hyaline cartilage as a protective reaction of the body.
4. Morphofunctional characteristics of cartilage tissue cells (osteochondrogenic, chondroblasts, chondrocytes).
5. Morphobiochemical characteristics of the intercellular substance of cartilage.
6. The structure of articular cartilage.
7. Regeneration and transplantation of cartilage tissue (cartilage).
8. Bone tissue. General principle of bone tissue organization. Classification of bone tissues and their localization.
9. Definition of the concepts "bone tissue" and "bone as an organ".
10. The structure and significance of bone tissue cells (osteochondrogenic, osteoblasts, osteocytes, osteoclasts).

11. Features of the structure of the intercellular substance (matrix) of bone tissue.
12. Embryonic osteogenesis (bone development from mesenchyme (direct osteogenesis) and bone development in place of cartilage (indirect osteogenesis).
13. Regeneration of bone tissue. Factors influencing the structure of bone tissue. Hormonal regulation of bone metabolism. Restructuring of bone in the postnatal period of development. Age-related changes.
14. Methods of connecting bones.

6). Muscle tissue.

1. General characteristics and histogenetic classification of muscle tissue (striated muscle and smooth muscle tissue). The concept of structural-functional unit.
2. Development, morphological and functional characteristics, microscopic and electron microscopic structure of the striated (striated) skeletal muscle tissue. The mechanism of muscle contraction. Types of muscle fibers and their innervation.
3. Regeneration of skeletal muscle tissue, the importance of myosatellite cells.
4. Muscle as an organ. Connection with tendon.
5. Cardiac striated (striated) muscle tissue. Source of development, stages of histogenesis.
6. Morphofunctional characteristics of working, conducting and secretory cardiomyocytes.
7. Smooth (unstriated) muscle tissue. Source of development. Morphological and functional characteristics of structural features and contractions. Regeneration.
8. Myoneural tissue. Myoid cells and moepithelial cells. Source of development, structure and function.

7). Nervous tissue.

1. General characteristics of nervous tissue. Embryonic sources of development and histogenesis of nervous tissue.
2. Structural components of nervous tissue: neurocytes, neuroglia.
3. Features of the structure of a neuron (neurocyte). Structure of the neuron body (perikaryon).
4. The cytolemma of a neuron, its role in the generation and conduction of excitation. Morphofunctional characteristics of the neuron nucleus and its organelles. Cytoskeleton of a neuron, its characteristics, significance.
5. Transport processes in the cytoplasm of neurons. Axonal transport - anterograde and retrograde. Fast and slow transport, the role of microtubules.
6. The concept of neurotransmitters
7. Secretory neurocytes (neurosecretory cells), their structure, function, localization.
8. Physiological death of neurons. Neuronal regeneration.
9. Neuroglia. General characteristics. Sources of gliocyte development. Classification. Macroglia (oligodendroglia, astroglia and ependymal glia). Microglia (glial macrophages).
10. Nerve fibers (myelinated and unmyelinated). General characteristics. Peculiarities formation, structure and function of nerve fibers in the central nervous system and PNS. Degeneration and regeneration of nerve fibers.
11. Nerve endings. General characteristics. Classification. Receptor (sensitive) endings or receptors, their morphological types, function.
12. Effector endings are motor and secretory. Neuromuscular ending (motor plaque) in skeletal muscle and smooth muscle tissue. Secretory nerve endings.
13. Interneuronal synapses, their structure, significance. Classification of synapses.
14. The principle of organization of the reflex arc.

Section 4. Particular histology

1). Nervous system.

1. Embryonic sources of development of the central and peripheral parts of the nervous system.
2. The structure of the peripheral nerve and its sheaths. Peripheral nerve regeneration.
3. The structure of the spinal ganglia (types, location and functional significance of neurons).
4. Composition of gray and white matter of the spinal cord.
5. Nuclei of the posterior, lateral and anterior horns of the gray matter of the spinal cord (morphological, functional characteristics, tracts starting from them).

6. Neurogliocytes of the spinal cord, structure, significance.
7. Distribution of B. Rexed plates in the gray matter of the spinal cord.
8. Cords of white matter of the spinal cord (posterior, lateral, anterior). Their morphological and functional characteristics.
9. Reflex arc of a simple somatic reflex.
10. Brain. Development (ontogenesis) of the brain.
11. Brain stem (medulla oblongata, pons, midbrain, diencephalon, hypothalamus), histological structure, significance.
12. Reticular formation, localization, structure and significance.
13. General plan of the structure of the cerebellum and its significance.
14. Morphofunctional characteristics of the cerebellar cortex.
15. Neurons of the molecular layer of the cerebellar cortex, their structure and function. Neurons of the ganglion layer of the cerebellar cortex, their structure and function. Neurons of the granular layer of the cerebellar cortex, their structure and function. Cerebellar gliocytes.
16. Afferent and efferent pathways of the cerebellum. How are they educated?
17. Connections between neurons of the cerebellar cortex. Modern ideas about excitatory and inhibitory neurons.
18. Cerebellar nuclei, their localization, significance.
19. Cerebral cortex. Embryonic and postembryonic histogenesis.
20. Neuronal composition of the cerebral cortex (pyramidal and non-pyramidal cells). Structure and classification of pyramidal cells of the gray matter of the cerebral cortex. Betz cells of the motor cortex, localization, significance.
21. Blood-brain barrier, its structure and function.
22. Cytoarchitecture of the cerebral cortex. The role of V.A. Betz in the development of the field theory of the cerebral cortex.
23. Myeloarchitecture of the cerebral cortex: associative, commissural and projection fibers.
24. Modular principle of organization of the nervous system.
25. Autonomic (autonomic) nervous system (ANS): sympathetic, parasympathetic and metasympathetic divisions. General characteristics of the structure.
26. Structure and neural composition of ganglia (extramural and intramural). Pre- and postganglionic nerve fibers.

2). Sensory system (sense organs).

1. Classification. General principle of cellular organization of receptor compartments. Neurosensory and sensoroepithelial receptor cells.
2. Organ of vision. Sources and course of embryonic development of the organ of vision. The principle of structure and tissue composition of the membranes of the eyeball wall.
3. Dioptric apparatus of the eye, its composition. Accommodative apparatus of the eye, its composition. The receptor apparatus of the eye, its tissue composition. Accessory apparatus of the eye, its composition.
4. The structure of the sclera - the white membrane of the eye, its significance.
5. Morphofunctional and biochemical characteristics of the cornea.
6. The choroid of the eye and its components. Structure and meaning.
7. Ciliary body and its processes, structure, significance.
8. Morphofunctional characteristics of the iris.
9. The structure and significance of the lens, ligament of cinnamon.
10. Drainage system of the eye and its components, significance.
11. Retina of the eye, structure, tissue composition. The concept of the blood-retinal barrier. Neuronal composition of the retina.
12. Accessory organs of the eye (eyelids, lacrimal apparatus).
13. Olfactory organ. Embryonic source of development. Structure and cellular composition of the olfactory lining.
14. Histophysiology of the olfactory organ. Age-related changes.
15. Vomeronasal organ.
16. Organ of taste. Embryonic development. Structure and cellular composition of taste buds.

17. Innervation of taste buds. Histophysiology of the taste organ. Age-related changes.
18. Organs of hearing and balance. Embryonic development. External ear: structure of the external auditory canal and eardrum.
19. Middle ear: auditory ossicles, characteristics of the epithelium of the tympanic cavity and auditory tube.
20. Inner ear: bony and membranous labyrinths. Vestibular part of the membranous labyrinth (elliptical and spherical sacs and semicircular canals, structure and cellular composition of the receptor section of the spots and ampullar ridges). Innervation.
21. Histophysiology of the vestibular labyrinth. Cochlear part of the membranous labyrinth: structure of the cochlear canal, structure and cellular composition of the spiral organ, its innervation.
22. Histophysiology of sound perception. Age-related changes.

3). The cardiovascular system.

1. Structure and embryonic development of the cardiovascular system.
2. General principles of the structure of blood vessels. Classification. Dependence of the structure of blood vessels on hemodynamic conditions. Angiogenesis, vascular regeneration. Age-related changes in the vascular wall.
3. Classification, structural features and functions of arteries of various types. Organ features of arteries.
4. Microcirculatory bed. Arterioles, their types and role in blood circulation. Structure. The importance of endothelial myocyte contacts in the histophysiology of arterioles.
5. Classification, structure and function of hemocapillaries. Morphological basis of capillary permeability and regulation of their functions. Organ features of capillaries.
6. Venules (their types, structure and functional significance).
7. Arteriovenular anastomoses (importance for blood circulation, classification, structure of various types).
8. Classification of veins (muscular and non-muscular type), structure of the vein wall of various types due to hemodynamic conditions. The structure of venous valves. Organ features of veins.
9. Classification of lymphatic vessels. The structure of lymphatic capillaries and various types of lymphatic vessels. The concept of lymphangion. Participation of lymphatic capillaries in the microcirculation system.
10. Embryonic development of the heart. The structure of the heart wall, its membranes, their tissue composition. Features of blood supply, innervation, regeneration of the heart.
11. Conducting system of the heart, its morphofunctional characteristics.
12. The heart of a newborn. Restructuring and development of the heart after birth. Age-related changes in the heart.

3rd semester.

Section 4. Particular histology

4). System of hematopoietic organs and immune defense.

1. General characteristics of the hematopoietic system and immune defense. The main sources and stages of formation of hematopoietic organs in human ontogenesis.
Central and peripheral hematopoietic organs.
2. Red bone marrow (structure, tissue composition, function, features of blood supply).
3. Yellow bone marrow (development in the prenatal period, age-related changes, regeneration).
4. Thymus. Embryonic development. The structure and tissue composition of the cortex and medulla of the lobules. Vascularization. The structure and significance of the blood-thymus barrier.
Temporary (accidental) and age-related involution of the thymus.

5. Spleen. Embryonic development. Structure and tissue composition (white and red pulp, T- and B-dependent zones). Blood supply to the spleen.
6. The lymph nodes. Embryonic development. Structure and tissue composition of the cortex and medulla. Vascularization. Age-related changes.
7. The structure, cellular composition and significance of lymphoid formations in the mucous membranes (lymphoid nodules and diffuse accumulations in the wall of the airways, digestive tract and other organs).
8. Morphological basis of the body's defense reactions.
9. Type of immunity (humoral and cellular), characteristics of the main cells, carrying out immune reactions (macrophages, antigen-presenting cells, T-lymphocytes, B-lymphocytes, plasma cells).
10. Concept of antigens and antibodies. Antigen-independent and antigen-dependent differentiation of lymphocytes. Effector cells and memory cells. Regulation of immune reactions: cytokines, hormones.

5). Endocrine system.

1. General characteristics and classification of the endocrine system (central and peripheral endocrine glands). The concept of hormones, target cells and their hormone receptors. Mechanisms of regulation in the endocrine system.
2. Hypothalamus, its structure, significance. Hypothalamic-adenopituitary and hypothalamic-neurohypophyseal systems. Regulation of the functions of the hypothalamus by the central nervous system.
3. Pituitary. Embryonic development. Structure and functions of the adeno- and neurohypophysis. The middle (intermediate) lobe of the pituitary gland and its features in humans. Vascularization and innervation of the pituitary gland. Age-related changes.
4. Structure, cellular composition, function of the pineal gland. Age-related changes.
5. Sources of development, structure, cellular composition, functions of the thyroid gland. The role of hormones. Restructuring of follicles due to different functional activities. Vascularization and innervation of the thyroid gland.
6. Sources of development, structure and cellular composition of the parathyroid glands. Role in the regulation of mineral metabolism. Vascularization, innervation and regulatory mechanisms of the parathyroid glands. Age-related changes.
7. Sources of development of the adrenal glands (fetal and definitive adrenal cortex). Structure, cellular composition of the adrenal cortex zone, synthesis and secretion of hormones,
regulation of hormone synthesis.
8. Structure, cellular composition, hormones and role of brain endocrinocytes (epinephrocytes) of the adrenal medulla. Age-related changes in the adrenal gland.
9. Endocrine structures of mixed secretion glands.
10. Endocrine islets of the pancreas. Endocrine function of the gonads (testes, ovaries), placenta.
11. Single hormone-producing cells. Concept of the diffuse endocrine system (DES), localization, cellular composition of endocrinocytes, structure, hormones. Ideas about the APUD system (neuroendocrine cells).

6). Digestive system.

1. The main sources of development of tissues of the digestive system in embryogenesis. The general principle of the structure of the wall of the digestive canal (mucosa, submucosa, muscular layer, outer membrane (serous or adventitia), their tissue and cellular composition.
2. Innervation and vascularization of the wall of the digestive tube. Endocrine apparatus of the digestive system. Lymphoid structures of the digestive tract.
3. Anterior section of the digestive system. Oral cavity. The structure of the mucous membrane in connection with the function and characteristics of digestion in the oral cavity.

4. The structure of the lip, cheek, hard and soft palate, tongue, gums, tonsils.
5. Large salivary glands. Classification, sources of development, structure and functions. The structure of the secretory sections and excretory ducts.
6. Features of the structure of the tongue, the mucous membrane on its upper and lower surfaces, types of papillae of the tongue, their structure and functions.
7. The structure of enamel, dentin and cementum of the tooth, their function and chemical composition.
8. The structure and significance of the dental pulp. The structure and significance of the periodontium.
9. Blood supply and innervation of the tooth. Development and change of teeth. Age-related changes.
10. Pharynx and esophagus. The structure and tissue composition of the wall of the pharynx and esophagus in its various parts. Glands of the esophagus, their histophysiology.
11. Middle and posterior sections of the digestive system. Stomach. The structure of the mucous membrane in various parts of the organ. Localization, structure and cellular composition of glands in various parts of the stomach. Blood supply and innervation of the stomach. Age structural features of the stomach.
1. Structure, tissue composition of the wall of the small intestine, the "villus - crypt" system as a structural and functional unit. Histophysiology of the process of parietal digestion and absorption. Cytophysiology of exo- and endocrine cells. Regeneration of the epithelium of the small intestine. Blood supply and innervation. Age-related changes in the wall. Lymphoid formations in the intestinal wall.
2. The structure of the colon wall, tissue composition. Lymphoid formations in the large intestine. Blood supply.
3. Features of the structure and function of the vermiform appendix.
4. Rectum. Wall structure.
5. Structure and function of the exocrine and endocrine parts of the pancreas.
6. Blood supply. Innervation. Regeneration. Features of histophysiology in different periods of childhood. Changes in the pancreas during aging.
7. Features of blood supply to the liver, structure and function of hepatocytes classical lobule as a structural and functional unit of the liver. Concepts of the portal lobule and acini.
8. The structure of bile canaliculi (cholangioles) and interlobular bile ducts of the liver. Mechanisms of bile circulation through them. Innervation. Regeneration. Features of the structure of the liver of newborns. Age characteristics.
9. Structure and function of the gallbladder and bile ducts.

7). Respiratory system.

1. Airways and respiratory section of the respiratory system. Development. Age characteristics. Regeneration.
2. The structure of the wall of the extrapulmonary airways (nasal cavity, larynx, trachea and main bronchi), tissue composition, histophysiology of their membranes.
3. Lungs. Intrapulmonary airways (bronchi and bronchioles), the structure of their walls depending on their caliber.
4. Structural components of the acinus; structure of the alveolar wall, structural and chemical organization and function of the surfactant-alveolar complex. Structure interalveolar septa.
5. The airborne barrier and its importance in gas exchange. Lung macrophages. Blood supply to the lung.
6. Morpho-functional characteristics of the pleura.

8). Leather and its derivatives.

1. Tissue composition, skin development. Regeneration.
2. The main cell differentials in the epidermis, layers of the epidermis, their cellular composition. Features of the structure of the epidermis of "thick" and "thin" skin.
3. The concept of the keratinization process, its significance. Cellular renewal of the epidermis and an idea of its proliferative units and columnar organization.

4. Local immune surveillance system of the epidermis (Langerhans cells and lymphocytes, their histofunctional characteristics). Pigment cells of the epidermis, their origin, structure and role. Tactile cells. Basement membrane, dermal-epidermal junction.
5. Dermis, papillary and reticular layers, their tissue composition. Features of the structure of the dermis in the skin of various parts of the body - feet, palms, face, joints, etc.
6. Histofunctional characteristics of the immune system in the dermis. Vascularization of the skin. Hypodermis.
7. Skin glands (sebaceous, sweat), their development, structure, histophysiology.
8. Mammary glands - see section "Female reproductive system". Age-related features of the skin and its glands.
9. Leather derivatives. Hair, its development, structure, growth, change, innervation.
10. Nails. Development, structure and growth of nails.

9). System of urinary and urinary organs.

1. General characteristics of the urinary organ system. Development.
2. Cortical and medulla of the kidney, nephron, as a morphofunctional unit of the kidney, its structure. Types of nephrons, their topography in the cortex and medulla.
3. Vascularization of the kidney (cortical and juxtamedullary blood supply systems). Renal corpuscles, their main components, structure of vascular glomeruli. Mesangium, its structure and function. Structural organization of the renal filter and its role in urination.
4. Juxtaglomerular apparatus (endocrine apparatus of the kidney), structure and function.
5. Histophysiology of nephron tubules and collecting ducts in connection with their participation in the formation of final urine. The concept of the countercurrent system of the kidney. Stroma kidneys, its histofunctional characteristics.
6. Innervation of the kidney. Regenerative potencies. Features of the kidney in a newborn. Subsequent age-related changes in the kidney.
7. Urinary tract. The structure of the wall of the renal calyces and pelvis. Structure ureters. Structure of the bladder. Concept of cystoids. Features of the structure of the male and female urethra.

10). Reproductive systems.

1. Development. Primary gonocytes, initial localization, migration paths to the rudiment of the (indifferent) gonad. Sexual differentiation.
2. Male genital organs. Histogenetic processes in the gonad primordium leading to the development of the testis. Development of the vas deferens.
3. The general principle is the structure of the testis, the structure of the wall of convoluted seminiferous tubules, straight tubules. Spermatogenesis. Blood-testis barrier. Endocrine function. Regulation of the generative and endocrine functions of the testicle. Age peculiarities.
4. Vas deferens. Epididymis. Vas deferens. Seminal glands. Ejaculatory duct. Bulbo-urethral glands. Prostate. Their structure and functions. Age-related changes. Penis. Their structure, meaning.
5. Female genital organs. Development, general characteristics of the structure of the ovary. Oogenesis. Differences between oogenesis and spermatogenesis.
6. The concept of the ovarian cycle and its regulation. Development, structure and functions of the corpus luteum during the ovarian cycle and during pregnancy. Follicular atresia.
7. Endocrine function of the ovary (female sex hormones and the endocrinocytes that produce them). Age characteristics.
8. The structure of the uterine wall (endometrium, myometrium, perimetry) in its different parts. Menstrual cycle and its phases. Relationship between cyclic changes in the endometrium and ovary.
Restructuring of the uterus during pregnancy and after childbirth. Vascularization and innervation of the uterus. Age-related changes.

9. Development, structure and functions of the fallopian tubes.
10. Vagina. Development. The structure of its walls. Change due to the menstrual cycle.
11. Mammary (breast) gland. Origin. Development. Structure. Postnatal changes. The structure of lactating and non-lactating (non-functioning and after lactation) mammary glands. Neuroendocrine regulation of mammary gland functions.
Changes in the mammary glands during the ovarian-menstrual cycle and during pregnancy.

Section 5. Human embryology (Early embryogenesis).

1. An idea of the biological processes underlying the development of the embryo (induction, determination, division, cell migration, growth, differentiation, cell interaction, cell death). Features of human embryonic development.
Critical periods in development. Violation of determination processes as a cause of anomalies and deformities.
2. Progenesis. Spermatogenesis, oogenesis. Features of the structure of germ cells.
3. Fertilization. The biological significance of fertilization, features and chronology of this process. Male and female pronuclei, disintegration of their shells, establishment of the connection of the chromosomes of the pronuclei with the centriole of the sperm.
4. First week of development. A zygote is a one-celled embryo, its genome, activation of intracellular processes.
5. Splitting up. Peculiarities of crushing in humans. The structure of the embryo at different stages of cleavage. The role of the transparent zone. Morula. Blastocyst. Inner cell mass (embryoblast) and trophoblast. Free blastocyst stage. Condition of the uterus at the beginning of implantation. Beginning of the 1st phase of gastrulation.
6. Implantation. Differentiation of trophoblast into cytotrophoblast and syncytiotrophoblast. Activation of syncytiotrophoblast. Formation of lacunae and their connection with endometrial blood vessels. Histiotrophic type of nutrition. Formation of primary and secondary chorionic villi.
7. Second week of development. Gastrulation. Division of embryoblast into epiblast and hypoblast. Transformation of the hypoblast, formation of the primary yolk sac.
8. Transformation of the epiblast (formation of the amniotic cavity and release of the amniotic ectoderm, formation of the amniotic bladder), the beginning of the 2nd phase gastrulation by emigration with the formation of the primary streak and primary nodule, germinal mesoderm, head process, endoderm, prechordal plasticity.
Formation of extraembryonic mesoderm.
9. Third week of development. Differentiation of the embryonic mesoderm (somites, nephrogonotomes, visceral and parietal layers of the splanchnotome, embryonic coelom). Growth of the head process, formation of the notochord. Formation of the neural tube and neural crests, asynchronous development of the cerebral and caudal regions. Trunk fold, formation of the primary intestine.
10. Differentiation of the extraembryonic mesoderm of the allantois, amniotic bladder, vitelline stalk, connecting stalk, layer underlying the trophoblast.
11. Formation of primary blood vessels and primary blood cells in the mesoderm of the yolk sac, connecting stalk. Formation of the first blood vessels in the mesoderm of the embryo. The rudiment of the primary heart, the beginning of function. Layer of the kidney, lung.
12. Formation of tertiary chorionic villi. Hematotrophic type of nutrition.
13. Fourth week of development. Change in the shape of the embryo (formation of transverse and longitudinal folds). Completion of the processes of neurulation and segmentation of mesoderm.
Auricular and lens placodes. Development of mesonephros. Migration of gonocytes from the vitelline endoderm of the caudal end of the embryo. Formation of the mouth (breakthrough of the oropharyngeal membrane), formation of the spinal column. Bookmark

adenohypophysis, thyroid and parathyroid glands, stomach, liver, dorsal part of the pancreas.
10. Embryonic organogenesis.
11. Extraembryonic organs. Placenta, formation, structural features of the maternal and fetal components during pregnancy. Accelerated development of connective tissue of the placenta and other extra-embryonic organs. Structural differences between terminal and difenitive villi in different trimesters of pregnancy, placental functions.
12. Amnion, its structure and significance.
13. The umbilical cord, its formation and structural components: gelatinous (mucous) tissue, vessels, rudiments of the yolk sac and allantois. The mother-placenta-fetus system and factors influencing its physiology.
14. Features of the newborn's body. General characteristics and periodization of postnatal development.
15. Factors influencing development: genetic, maternal, external (radiation, alcohol, smoking, drugs, infection, chemicals and drugs, pesticides, etc.).

Practical skills and abilities:

- microscopy of microslides

1. two day old chicken embryo
2. fibroblasts and macrophages
3. elastic cartilage
4. heart muscle
5. myelinated nerve fibers

- electron diffraction analysis

1. intercellular contacts
2. air-blood barrier wall

CRITERIA for assessing competencies and rating scales

Grade "unsatisfactory"(not accepted) or absence competence development	**Grade "satisfactorily"(passed) or satisfactory (threshold) level of competence development**	**Rating "good" (passed) or sufficient level of mastery competencies**	**"Excellent" grade (passed) or high level of development competencies**
Inability of the learner to learn independently demonstrateknowledge when solving tasks, lack of independence in using skills. Absence confirmation of the availability of competence indicates negative results of development academic discipline	The student demonstrates independence in applying knowledge, skills and abilities to solve educational tasks in full accordance with a sample given by the teacher for tasks whose solutions were shown teacher, it should be considered that the competence	The student demonstrates independen tapplication of knowledge, skills and abilities in solving tasks similarsamples, which confirms the presence forme dcompetencies at a higher level. Availability such competence	The student demonstratesability to complete independence in choosing a solution non-standar dassignments within the discipline using knowledge, skills and abilities, received both during the development of this discipline,
	formed at a satisfactory level.	at a sufficient level indicates sustainable fixed practical skill	and related disciplines, competence should be considered formed at a high level.

Criteria for assessing test control:

percentage of correct answers	Marks
91-100	Great
81-90	Fine
70-80	satisfactorily
Less than 70	unsatisfactory

Interview assessment criteria:

Mark	**Descriptors**		
	strength of knowledge	**the ability to explain (represent) the essence of phenomena, processes, draw conclusions**	**logic and consistency answer**
Great	strength of knowledge, knowledge of the basic processes of the subject being studied areas, the answer differs in depth and completeness disclosure of the topic; possession terminological apparatus; logic and consistency answer	high ability to explain the essence, phenomena, processes, events, draw conclusions and generalizations, give reasoned answers, give examples	high logic and consistency of the answer
Fine	strong knowledge of the basic processes of the subject area being studied, distinguished by the depth and completeness of the topic; possession terminologica lapparatus; free proficiency in monologue speech, but is allowed one or two inaccuracies in the answer	the ability to explain the essence, phenomena, processes, events, draw conclusions and generalizations, give reasoned answers, give examples; however, one or two inaccuracies in the answer are allowed	logic and response sequence
satisfactory	satisfactoryknowledge of the processes of the subject area being studied, the answer differs insufficient depth and completeness of the topic; knowledge of basic theoretical issues.	satisfactorythe ability to give reasoned answers and give examples; well-developed analytical skills phenomena, processes.	satisfactorylogic and response sequence

	There may be some errors in the content. answer	There may be some errors in the content. answer	

unsatisfactory	poor knowledge of the subject area being studied, shallow disclosure Topics; poor knowledge of basic theoretical issues, poor skills in analyzing phenomena and processes. There are serious errors in the content answer	inability to give reasoned answers	absencelogic and response sequences

Criteria for assessing situational tasks:

Mark	**Descriptors**			
	understanding the problem	**analysis of the situation**	**solution skills situations**	**professional thinking**
Great	full understanding Problems. All requirements for the task completed	high ability to analyze the situation, draw conclusions	high abilitychoose a solution method problems, sure situation solving skills	high level professional thinking
Fine	full understanding Problems. All requirements for the task completed	ability to analyze a situation, draw conclusions	abilitychoose a solution method problems sure situation solving skills	sufficient level of professional thinking. One or two inaccuracies in the answer are allowed
Satisfactory	partial understanding of the problem. Most of the requirement spresented for the task, completed	satisfactorystrong ability to analyze a situation, draw conclusions	satisfactor yadvanced situation-solving skills, difficulties with choosing a method for solving a problem	sufficient level of professional thinking. More than two inaccuracies in the answer or an error in solution sequences
unsatisfactory	misunderstanding of the problem. Many requirement srequirements for the task were not completed. No answer. There was no attempt to solve task	low ability to analyze the situation	insufficien tsituation solving skills	absent